REMARKS

This is intended as a full and complete response to the Office Action dated July 9, 2003, having a shortened statutory period for response set to expire on October 9, 2003. Please reconsider the claims pending in the application for reasons discussed below.

Claims 1-20 remain pending in the application and are shown above. Claim 9 has been canceled by Applicants, and claims 19 - 20 stand withdrawn by the Examiner. Claims 1-18 are rejected. Reconsideration of the rejected claims is requested for reasons presented below.

Claim 1 has been amended to include the limitations of claim 9. Claims 2, 8, 13, 14, and 17 have been amended to clarify the invention. Applicants submit that the changes made herein do not introduce new matter.

Claims 19 and 20 stand withdrawn from consideration by the Examiner. The Examiner has repeated the restriction requirement as stated in the Restriction Requirement mailed on March 26, 2003. Applicants filed a Response to Restriction Requirement on April 28, 2003 in which Group I, claims 1-18, was elected. Applicants presented the following arguments in the Response to Restriction Requirement:

The Examiner states that the apparatus of Group II (claims 19 and 20) can be used to practice another and materially difference process, such as etching. Applicants note that the apparatus of claim 19 includes means for introducing a process gas containing SiF_4, SiF_4, and an oxygen source substance and a power source for generating a plasma of the process gas. Applicants submit that the apparatus of claim 19 is adapted to deposit a film by generating a plasma of a process gas containing SiF_4, SiF_4, and an oxygen source substance, as recited in claims 1 and 13. Thus, Applicants submit that the methods of claims 1 and 13 should not be restricted from the apparatus of claim 19. Applicants respectfully request withdrawal of the restriction requirement.

The Patent Office has indicated that the Response to Restriction Requirement was received on May 5, 2003. The Examiner has not indicated that the Response to Restriction Requirement was considered. Applicants respectfully request consideration of the Response to Restriction Requirement filed on April 28, 2003 and withdrawal of the restriction requirement.

Claims 1-18 stand rejected under 35 USC § 103(a) as being unpatentable over *Narwankar* (U.S. Patent No. 6,136,685) in view of *Nimi* (U.S. Patent No. 6,503,846). Regarding claim 1, the Examiner states that *Narwankar* teaches a deposition method of forming a silicon inorganic insulating film on a substrate by placing a substrate in a semiconductor manufacturing apparatus having a parallel plate type electrode and depositing a fluorine-containing insulating film on the substrate by generating a plasma of a process gas containing SiH4, SiF4, and an oxygen source (column 14, lines 15-25). Regarding claim 9, the Examiner states that *Narwankar* teaches a flow rate ratio of the SiF_4 to the silane is larger than 1 (column 15, Table 1). Applicants respectfully traverse the rejection.

Narwankar provides a gap filling method of depositing a halogen-doped silicon oxide from SiF_4, silane, and oxygen over metal lines. In the preferred HDP-CVD chamber shown and described in *Narwankar*, RF power is provided to coils 29 and 30. RF power is also provided to the substrate support 22 so that the substrate may be biased (Figure 5A, column 6, lines 21-47). *Narwankar* provides two embodiments for depositing a halogen-doped silicon oxide. In one embodiment, a two step deposition is performed in which the bias power is decreased in the second step to increase the temperature, and thus increase the deposition of the halogen-doped silicon oxide relative to the etching of the halogen-doped silicon oxide by the fluorine from the SiF_4 (column 4, lines 7-14). The SiF_4: SiH_4 ratios in this embodiment are .75 for the first step and .81 for the second step (Table 1). In the second embodiment, a two step deposition is performed in which the ratio of SiF_4: SiH_4 is decreased from the first step to the second step so that the amount of fluorine present in the second step is reduced, and the deposition to etch rate is enhanced to increase the deposition rate of the oxide in the second step (column 4, lines 15-26). *Narwankar* provides an example of a SiF_4: SiH_4 ratio for the first step of 0.70 and a SiF_4: SiH_4 ratio for the second step of 0.50 (column 15, lines 50-57) and a range of SiF_4: SiH_4 first and second ratios of 0.6-0.8 and 0.4-0.6, respectively. While Figure 2 of *Narwankar* shows the time required to deposit layers of different thicknesses using gas mixtures having SiF_4: SiH_4 ratios of 0.0 to 1.0, there is no teaching or suggestion in *Narwankar* that a SiF_4: SiH_4 ratio of larger than 1 should be used to deposit films. In fact, *Narwankar* teaches away from high SiF_4: SiH_4

ratios, as Figure 2 shows that higher SiF_4: SiH_4 ratios increase the deposition time required to deposit a layer of a certain thickness, and *Narwankar* states that is desired that the layers be deposited in the least amount of time (column 3, lines 28-29).

Applicants further submit that *Narwankar* in view of *Nimi* does not teach or suggest depositing a fluorine-containing silicon insulating film on a substrate by generating a plasma of a process gas containing SiH_4, SiF_4 and an oxygen source substance, wherein a flow rate ratio of said SiF_4 to said SiH_4 into the semiconductor manufacturing apparatus is larger than 1. *Nimi* provides a method that includes depositing an oxygen-containing film and then introducing nitrogen into the film. *Nimi* does not describe depositing a fluorine-containing silicon insulating film from a plasma of a process gas containing SiH_4, SiF_4, and an oxygen source substance.

Narwankar in view of *Nimi* does not teach, show, or suggest a deposition method of forming a silicon inorganic insulating film on a substrate, comprising placing a substrate in a semiconductor manufacturing apparatus having parallel plate type electrodes, and depositing a fluorine-containing silicon insulating film on the substrate by generating a plasma of a process gas containing SiH_4, SiF_4, and an oxygen source substance, wherein a flow rate ratio of said SiF_4 to said SiH_4 into the semiconductor manufacturing apparatus is larger than 1, as recited in claim 1. Applicants respectfully request withdrawal of the rejection of claim 1 and of claims 2-8 and 10-12, which depend thereon.

Regarding claim 13, Applicants submit that *Narwankar* does not teach or suggest forming conductive portions of a damascene structure in a silicon insulating film. *Narwankar* only describes gap filling methods in which insulating regions are formed in a previously deposited metal layer. *Nimi* describes depositing and treating insulating films, but does not describe forming conductive portions of a damascene structure in a silicon insulating film.

Narwankar in view of *Nimi* does not teach, show, or suggest a method of manufacturing a semiconductor device having conductive portions of a damascene structure on a substrate, comprising depositing a fluorine-containing silicon insulating film on a substrate by generating a plasma of a process gas containing SiH_4, SiF_4, and an oxygen source substance, said process gas being introduced into the chamber of the

semiconductor manufacturing apparatus having parallel plate type electrodes, and forming said conductive portions of the damascene structure in said silicon insulating film, as recited in claim 13. Applicants respectfully request withdrawal of the rejection of claim 13 and of claims 14-18, which depend thereon.

Applicants further submit that *Narwankar* in view of *Nimi* does not teach, show, or suggest a method of manufacturing a semiconductor device having conductive portions of a damascene structure on a substrate, comprising depositing a fluorine-containing silicon insulating film on a substrate by generating a plasma of a process gas containing SiH_4, SiF_4, and an oxygen source substance, said process gas being introduced into the chamber of the semiconductor manufacturing apparatus having parallel plate type electrodes, wherein a flow rate of said SiF_4 to said SiH_4 into the semiconductor manufacturing apparatus is larger than 1, and forming said conductive portions of the damascene structure in said silicon insulating film, as recited in claim 18. As discussed above with respect to claim 1, neither *Narwankar* nor *Nimi* teaches or suggests a method of depositing a fluorine-containing silicon insulating film from a process gas containing SiH_4, SiF_4, and an oxygen source substance, wherein a flow rate of said SiF_4 to said SiH_4 into the semiconductor manufacturing apparatus is larger than 1. Applicants respectfully request withdrawal of the rejection of claim 18.

In conclusion, the references cited by the Examiner, alone or in combination, do not teach, show, or suggest the invention as claimed.

Having addressed all issues set out in the office action, Applicant respectfully submits that the claims are in condition for allowance and respectfully request that the claims be allowed.

Respectfully submitted,

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